EPA
www.epa.gov/research
science in ACTION
INNOVATIVE RESEARCH FOR A SUSTAINABLE FUTURE

Sustainable and Resilient Resources Achieving Net Zero Waste, Water, and Energy

EPA and the Army pilot NetZero technologies and innovations on military installations

In 2011, EPA's Office of Research and Development signed a Memorandum of Understanding (MOU) with the Honorable Katherine Hammack, Assistant Secretary of the Army for Installations, Energy and Environment to support the Army's Net zero Initiative. The Army began the net zero initiative in 2011 as a vision to enable the Army to appropriately safeguard available resources, manage costs and natural resources on its installations. The 17 net zero pilot installations participating in the initiative aim to produce only as much energy as used; limit freshwater use and increase water reuse; and reduce the generation of solid waste. Under the MOU, ORD is currently working with one pilot installation, Fort Riley, Kansas, to demonstrate new and innovative technology, methods and approaches that will not only help all installations achieve net zero goals, but also advance the state of the science. The hope is that joint successes can then be used by other Army and non-Army installations and, municipalities across the country.

In 2012, EPA signed a MOU with Dr. Dorothy Robyn, the Deputy Under Secretary of Defense for Installations and Environment to jointly promote and demonstrate innovative technologies on Department of Defense (DoD) bases. This not only complements the partnership with the Army, but expands opportunities to promote and transfer technology successes across the board to military bases and the surrounding communities.

How are EPA and the Army working together?

At Fort Riley, Kansas, EPA scientists and engineers are working with the Army, the Department of Energy's Pacific Northwest National Laboratory (PNNL), U.S. Army Corps of Engineers (USACE), U.S. EPA, U.S. Geological Survey's Kansas State University partnership, and other partners to identify and test a variety of technologies and innovations.

Under this truly cross agency, transdisciplinary, partnership, there are currently three research projects being conducted at Ft. Riley including:

Water reuse: This project will demonstrate and test the effectiveness of reducing drinkable water use through a decentralized treatment of wastewater from sewer lines also known as sewer mining. The advantage of a decentralized treatment system versus a centralized wastewater treatment plant is that a decentralized system decreases the pumping and infrastructure costs, which could decrease energy costs. It also increases water security for mission critical infrastructure located on the installation. At Ft. Riley, decentralized treatment systems will be installed and tested by EPA scientists and engineers. First, EPA will test a commercially available aerobic membrane bioreactor (MBR) for water treatment and store recycled water for local non-drinkable reuse at a scale of about 5,000 gallons per day. Second, EPA will test a more advanced anaerobic membrane bioreactor (AnMBR). In addition to treatment systems, tools that monitor the performance of such systems will be demonstrated and evaluated. The performance data on such systems, including energy efficiency and maintenance costs, will provide decision makers at Ft. Riley and other Army facilities, a basis for selecting alternative approaches for reducing water and energy use.

Containment and Control of Contaminated Wastewater: Ft. Riley uses mostly recycled water and some potable water in a central vehicle wash facility to clean military vehicles. Water from this facility could be treated and reused elsewhere on the installation; however, a military vehicle might become contaminated with a chemical, biological or radiological (CBR) warfare agent in the field. This project will test ways, using harmless surrogates introduced into the wash water as substitutes for CBR agents. The dirty water which flows off of vehicles might contain oil, grease, metals, and mixtures of suspended solids like dirt and mud. This study is important because the presence of more organic/inorganic materials in water can affect the inactivation of these CBR agents. Data resulting from this study will then be available to cities, states, or the Department of Defense facilities that may have to treat large volumes of contaminated water.

Outreach and Water Conservation: This project addresses the social drivers of water demand and the effectiveness of water conservation education and outreach. For example, the amount of water used during showering is determined as much by technology used (i.e. high efficiency showerheads vs. standard showerheads) as it is by the length of time someone spends in the shower. The project will engage, educate, and empower the community living and working at Ft. Riley to conserve water resources at the installation, and measure the effectiveness of these efforts. In working with EPA on this project, Ft. Riley has become an EPA WaterSense partner - the first Army installation and has full access to tools and educational materials to meet the needs of the community. Approximately 60-80 participants on the installation will have their water consumption measured by water meters. The project will establish a residential water use profile for the installation. Based on this profile, EPA researchers will promote water conservation to educate the community about innovative water saving technologies. EPA is also working with Ft. Riley schools as part of the education and outreach component of the project. Data collected by water meters and from Army administered surveys will provide real-time feedback on the effectiveness of the outreach and conservation campaign. The entire Ft. Riley community will be encouraged to save water and identify waste hot-spots around the installation.

Building broader EPA and military partnerships

EPA is currently partnering with DoD in support of the Environmental Security Technology Certification Program (ESTCP) Water Reuse solicitation. Demonstration projects are sought for innovative, energy efficient, low maintenance systems for decentralized treatment and recycling of wastewater

on military installations. Projects will be selected, funded, and managed jointly with the EPA (ORD, Office of Water, National Center for Environmental Research, and National Exposure Research Laboratory) in support of ORD's Safe and Sustainable Water Resources (SSWR) Program. Successful technology demonstrations resulting from this effort will not only help advance the state of the science and SSWR research program, but also provide real world solutions to the U.S. military as well as communities and municipalities across the country. Awards are expected in March 2014.

What's next for EPA's Net Zero?

With the success of these partnerships, EPA is looking to expand their net zero-related activities to communities. The long-term objective of this effort is to help communities become more sustainable and resilient through the development and deployment of net zero strategies and technologies. By pooling federal, state, and local expertise and resources and, setting specific goals such as net zero waste, water, and energy, we anticipate that net zero strategies can be embraced by communities while simultaneously fostering economic growth and promoting citizen health and well-being.

The first step in expanding our net zero efforts to communities will be a workshop in Research Triangle Park, NC on February 25 and 26, 2014, entitled "Promoting Sustainable Communities through Net Zero Strategies." The workshop will convene experienced community leaders and Federal agencies for the purpose of identifying, 1) barriers, solutions, and lessons learned from implementing net zero waste, water, and energy strategies at various scales and 2) ways in which EPA and other Federal agency partners can facilitate and support these sustainability efforts. Stay tuned!